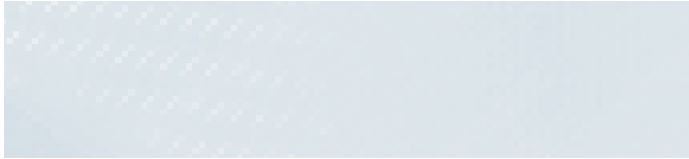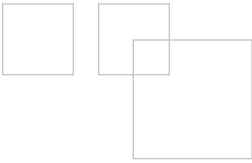- <u>Advanced EHF (AEHF)</u> – this program is the follow-on to Milstar. Currently scheduled to launch three satellites during FY07-09, AEHF provides up to ten times the capacity of Milstar, a significant increase in coverage, and the ability to support twice as many networks. It will support national, strategic and tactical users requiring protected, anti-jam, survivable communications for national crisis, Emergency Action Message dissemination, Integrated Tactical Warning/Attack Assessment, missile defense, presidential secure voice conferencing, and interoperability with selected international partners.

- <u>Commercial SATCOM</u> – Commercial SATCOM provides a much needed capability to deployed Joint Forces. Existing methods of forecasting and funding for these resources are usually ad hoc and cost prohibitive. The joint community and DISA need to create a strategy that will improve the integration of commercial SATCOM services into the overall DOD architecture.

- <u>Deployable Joint Command and Control System (DJC2)</u> – DJC2 provides SJFHQ's and Joint Force Commanders (JFCs) with a deployable, interoperable and scalable integrated C2 infrastructure supporting a common, standardized set of Joint C2 capabilities, integrated applications, and hardware. Residing at and deploying from a Combatant Command Headquarters, DJC2 will enhance a RCC's ability to rapidly activate and deploy a JTF with a common package that sustains operations for days or weeks, supports efficient routing of distributed C2 through collaborative networks, and decreases the lag between deployment and full operational capabilities. DJC2 includes limited communications capabilities with the en-route and early-entry configurations. However, it does not provide the external communications necessary to support larger Joint Force operations. Options are being developed to support sustained DJC2 external communication requirements.

- <u>GIG – Bandwidth Expansion (GIG-BE)</u> – GIG-BE is another initiative that addresses growing bandwidth requirements. This program is key to enabling the vision of universal situation awareness for the Joint Force. GIG-BE is scheduled to provide a fiber optic connection to over 100 global sites by

Space Systems

Wideband

- Defense Satellite Communication System
- Wideband Gapfiller System
- Transformational SATCOM System
- Global Broadcast Service

- Strategic Communications
- Some Tactical
- Intelligence, Defense Information Systems Network (DISN)
- Med and High Data Rates

Narrowband

- Mobile User Objective System
- Handheld Terminals
- Gateway provides link to rest of the GIG

- Mostly Voice
- Warfighter Nets
- Secured
- Low Data Rates

SHF   UHF

Space Systems

EHF   SHF/UHF

- Strategic and Tactical
- Highly Secure, Jam Resistant
- Low and Med Data Rates

- Secured
- Pay for Services
- Commercial Competition

- Milstar
- Advanced EHF
- Advanced Polar Satellite
- Transformational SATCOM System

- Inmarsat
- Iridium

Protected

Commercial

the end of FY05. Once completed, GIG-BE will provide a robust, optical IP network the Joint Force can use to share information at multiple levels of classification.

- **GIG Enterprise Services (GIG ES) and Network Centric Enterprise Services (NCES)** – GIG ES and NCES are two DOD initiatives to transform DOD to a network centric operating environment. The GIG ES Initial Capabilities Document (ICD), approved by the JROC on 22 Mar 04, describes "core" enterprise services available to all users and Communities of Interest (COI) enterprise services available to all users within the particular COI. NCES refers to all of the services available on the GIG.

The GIG ES aims to support an integrated, interoperable and networked Joint Force that will ensure common shared situation awareness, provide precise and actionable intelligence, support distributed and dispersed operations and ensure decision superiority enabling more agile and effective joint operations. GIG ES pertains to the Joint Force (both conventional and nuclear), intelligence and business domains and associated COI. This network centric operating environment must support:

- □ posting data to common, shared storage spaces as early as possible;

- □ alerting decision makers to changes in relevant DOD, non-DOD and multinational information or time-critical events affecting their survival or threatening their mission;

- □ users/entities, down to the "last tactical mile", with the capability to publish, subscribe, and pull whatever information they need, whenever they want, from wherever they are, limited only by the commander's information management policy;

- □ defense -in-depth information assurance (IA)/security;

- □ pooling and sharing of information across multiple security domains;

- □ interoperability among interagency, intergovernmental and multinational partners;

- □ the establishment of multiple position or role based profiles based on a users' role, function and geographic location

The objective of NCES is to deliver a service-oriented infrastructure for timely and secure user access to DOD and other National Security information from anywhere. The NCES program will deliver the first nine "core" enterprise services upon which all other services will rely. The services include:

- □ messaging (e-mail, DOD unique message formats, etc.);

- □ mediation (data translation and integration);

- □ discovery (search engines);

- □ storage (archive, continuity of operations, etc.);

- □ collaboration (chat, application sharing, whiteboard, etc.);

- information assurance/security (information and network protection);

- user assistance (learn and apply user preferences);

- application (allows users access to other enterprise services/data);

- enterprise system management (network health and configuration management).

GIG ES and NCES will provide DOD users the ability to use mission tailored information from anywhere within the network in a timely manner. This availability of information translates into a more effective and rapid execution of command and control within a given theater of operation and minimizes "forward deployed" systems in support of joint operation's functions. GIG ES and NCES facilitate the transition from a platform-centric environment to a network centric environment.
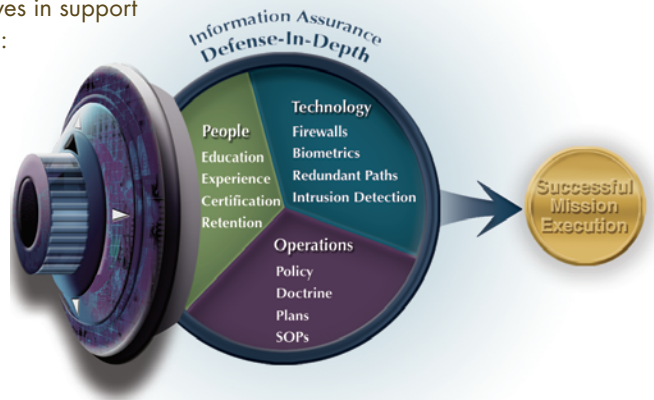
- GIG Information Assurance (GIG IA) – Information Assurance (IA) capabilities and components that support the network centric vision are a near-term DOD imperative. The IA objectives in support of the GIG architecture are:
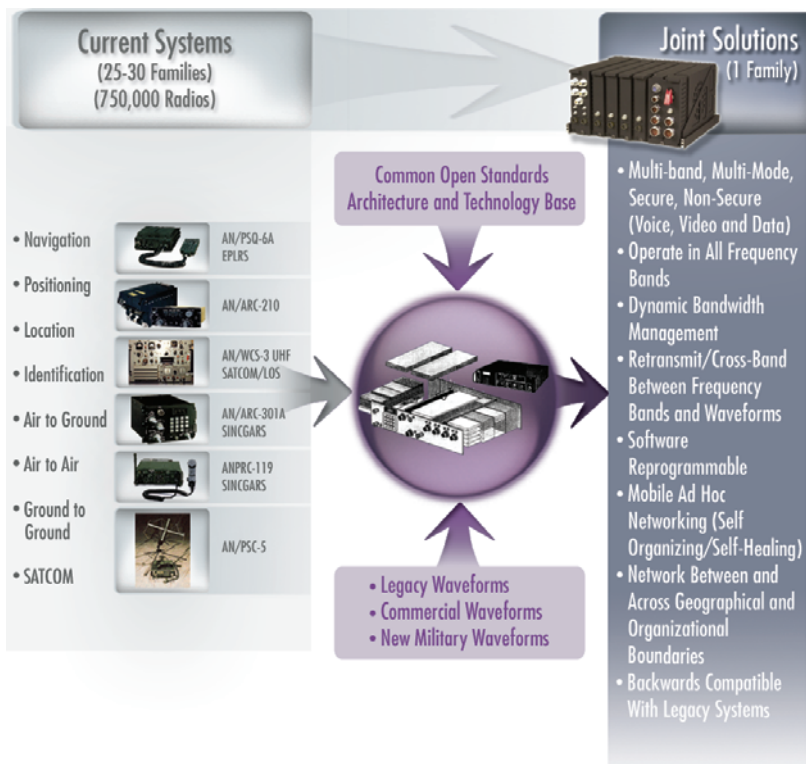
- To develop common unifying approaches for DOD components and the intelligence community.

- To apply these approaches in the development and acquisition of systems incorporating IA and IA-enabled products and services

The essential element is that IA be an embedded feature, designed into every system, holistically, within the family of systems that comprise the GIG. This requires a shift from today's model consisting predominantly of link encryption and boundary protection between multiple discrete networks, to an end-to-end, seamless interconnected information environment using "Defense-in-Depth".

Given the magnitude of the GIG vision and its IA implications, the GIG will be realized through a phased implementation in order to ensure that the IA capabilities, guidance and policies exist to safely and deterministically evolve to the next GIG "spiral". This also allows for the GIG to incorporate new technologies as they emerge, and drive the focus on targeted technology areas and associated standards development to realize the GIG vision capabilities.

Information Assurance
Defense-In-Depth

People
Education
Experience
Certification
Retention

Technology
Firewalls
Biometrics
Redundant Paths
Intrusion Detection

Operations
Policy
Doctrine
Plans
SOPs

Successful Mission Execution

Current Systems
(25-30 Families)
(750,000 Radios)

- Navigation
- Positioning
- Location
- Identification
- Air to Ground
- Air to Air
- Ground to Ground
- SATCOM

AN/PSQ-6A EPLRS
AN/ARC-210
AN/WCS-3 UHF SATCOM/LOS
AN/ARC-301A SINCGARS
ANPRC-119 SINCGARS
AN/PSC-5

Common Open Standards Architecture and Technology Base

- Legacy Waveforms
- Commercial Waveforms
- New Military Waveforms

Joint Solutions
(1 Family)

- Multi-band, Multi-Mode, Secure, Non-Secure (Voice, Video and Data)
- Operate in All Frequency Bands
- Dynamic Bandwidth Management
- Retransmit/Cross-Band Between Frequency Bands and Waveforms
- Software Reprogrammable
- Mobile Ad Hoc Networking (Self Organizing/Self-Healing)
- Network Between and Across Geographical and Organizational Boundaries
- Backwards Compatible With Legacy Systems

Joint Tactical Radio System (JTRS)

■ Joint Tactical Radio System (JTRS) – The Joint Tactical Radio System is an essential component to meeting 21st century warfighting requirements. It provides tactical units network centric capabilities through connectivity to the GIG. JTRS is a software reprogrammable radio that will provide real-time, voice, data and video communications among joint and coalition forces.

The JTRS is an IP-based radio set that includes routers, switches, and other networking components and functions. It will transform today's single channel radio capability from a loosely integrated collection of legacy systems into an integrated end-to-end system of systems. The JTRS "Family of Radios" is interoperable with legacy communication systems and capable of adding new waveforms requirements and technologies.

■ Mobile User Objective System (MUOS) – The MUOS will field five UHF satellites to provide on-demand, high capacity communications to support Intelligence,
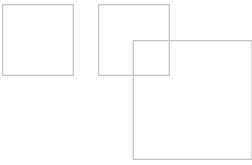
Surveillance, Reconnaissance (ISR) and mobile weapon system platforms on the move. MUOS launches are currently scheduled for FY09-11.

- Standing Joint Force Headquarters (SJFHQ) – SJFHQ is a full-time, joint C2 element that is part of the regional Combatant Commander's staff. The SJFHQ focuses on deliberate and crisis action planning and is a fully integrated participant in planning and operations activities. The SJFHQ exploit new organizational and operational concepts and technology to enhance the command's peacetime planning efforts, accelerate the efficient formation of a Joint Task Force (JTF) Headquarters, and facilitate crisis response by the Joint Force.

- Transformational SATCOM (TSAT) System – TSAT is a crucial program to meet impending space communication requirements in a network centric environment. It introduces two new capabilities to Military Satellite Communications (MILSATCOM) – IP routing in space and laser communications.

- Wideband Gapfiller System (WGS) – This program consists of five high capacity satellites planned for launch from FY05-FY10. WGS will replace the aging Defense Satellite Communication System (DSCS) and Global Broadcast Service satellites, providing DOD with high-capacity, wideband service for the nation.
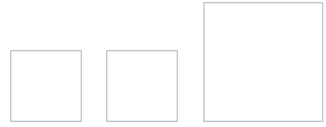
Director – Command, Control, Communications, and Computers Department, Deputy Department of Navy, Chief Information Officer (CIO)

John R. Thomas, Brigadier General, *U.S. Marine Corps*

"Transforming C4 is not an end state but a continuous process that builds on emerging operational concepts, new information technologies (IT), and new ways of horizontally fusing information across the battlespace. Operational concepts such as Expeditionary Maneuver Warfare (EMW) and Naval Power 21 (Sea Basing, Sea Strike, Sea Shield, and FORCEnet) drive the need to access and exploit the power of global networks to support decision-making, achieving decision superiority. The opportunity to exploit this new "digital dimension" of the battlefield, once enjoyed mainly by those in senior headquarters, now must extend down to the last tactical mile, pushing "power to the edge." Assured access to the network and information is essential to successful warfighting whether forces are static or on-the-move…"